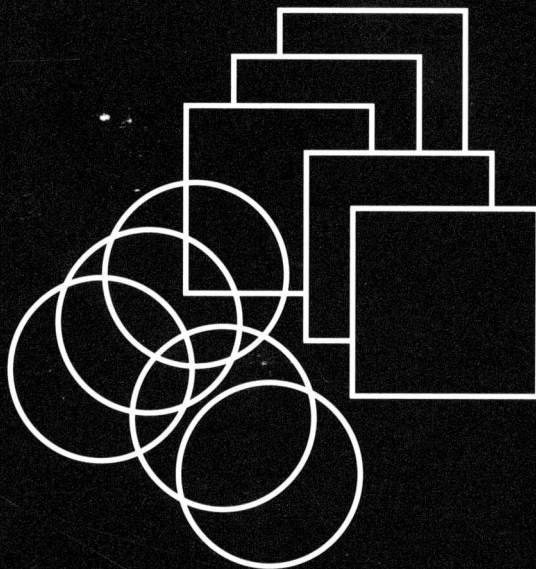


*Research Issues  
in  
Electronic Records*



*National Historical Publications and Records Commission*

On January 24-25, 1991, forty-six individuals from a variety of disciplines gathered in Washington, D.C., for the Working Meeting on Research Issues in Electronic Records. The purpose of the meeting, sponsored by the Minnesota Historical Society and funded by a grant from the National Historical Publications and Records Commission (NHPRC), was to:

- identify issues
- describe research opportunities, methodologies, and projects
- determine priorities for projects contributing to the better management of archival information in electronic form

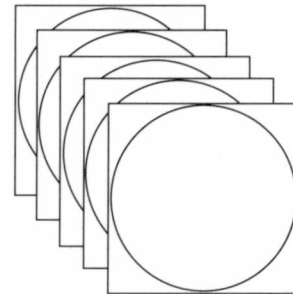
In short, meeting participants were to examine issues related to the identification, preservation, and long-term use of electronic records and to produce a national agenda for research in the archival management of such records. Their recommendations were to guide the NHPRC and other funding agencies interested in supporting archival electronic records projects.

Participants met in task groups to develop questions constituting a foundation for a research agenda:

1. What functions and data are required to manage electronic records in accord with archival requirements? Do data requirements and functions vary for different types of automated applications?
2. What are the technological, conceptual, and economic implications of capturing and retaining data, descriptive information, and contextual information in electronic form from a variety of applications?
3. How can software-dependent data objects be retained for future use?
4. How can data dictionaries, information resource directory systems, and other metadata systems be used to support electronic records management and archival requirements?
5. What archival requirements have been addressed in major systems development projects and why?
6. What policies best address archival concerns for the identification, retention, preservation, and research use of electronic records?
7. What functions and activities should be present in electronic records programs and how should they be evaluated?
8. What incentives can contribute to creator and user support for electronic records management concerns?
9. What barriers have prevented archivists from developing and implementing archival electronic records programs?
10. What do archivists need to know about electronic records?

The order in which the questions are addressed is important. Specifically, progress on the first three questions should precede major projects addressing the last seven questions. This is because the first three projects will define the requirements of archival electronic records programs; explore the conceptual,

## *Executive Summary*



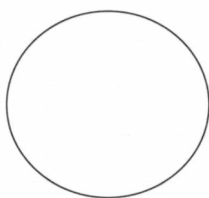
economic, and technological constraints on the long-term retention of electronic records; and establish criteria against which to measure the effectiveness of policies, methods, and programs.

The Working Meeting on Research Issues in Electronic Records recognized three other categories of activities—analysis, advocacy, and action—that archivists must undertake to assure successful electronic records management. And it urged adoption of specific criteria for the solicitation and evaluation of proposed projects. Projects should:

- be suitable for support from multiple funding and institutional sources
- build on prior work
- be multidisciplinary in conception and execution
- produce usable models or have generalizable results
- apply, evaluate, or modify existing archival principles
- produce recommendations that, if adopted, would benefit archival management or users of archival records
- consider political and policy implications
- determine costs, benefits, and other economic impacts
- identify mechanisms required for widespread implementation
- be published in the professional literature (Reports on results are to be placed in the Archives Library Information Center (ALIC) of the National Archives.)

The working meeting strongly urged the NHPRC to exert leadership in the electronic records field by establishing specific priorities for electronic records research supported with NHPRC funds, by serving as a facilitator for multidisciplinary research with allied professions, and by encouraging other Federal funding agencies and private foundations to sponsor or support electronic records research.

## Foreword



As chairman of the National Historical Publications and Records Commission (NHPRC) and Archivist of the United States, I am keenly aware of the problems associated with the long-term preservation and use of information in electronic form. The last decade has witnessed a rapid proliferation of new information technologies and widespread use of computers in all sectors of society. Archives must quickly develop the capacity to preserve records in a growing variety of formats, from paper to audiovisual records to computer tapes and disks, to ensure that a valuable and usable historical record is available to the historians, social scientists, genealogists, journalists, lawyers, policy analysts, and private citizens who use archives today or will wish to use them in the future.

There are many applied research questions about preserving archival electronic records for which we do not have the answers. The Working Meeting on Research Issues in Electronic Records was an invaluable exercise, bringing together individuals from a variety of disciplines to help articulate the questions. But unless the questions are answered, the barriers to effective action will remain.

A major theme for the meeting and this report is that the archival profession must take an interdisciplinary approach in answering these questions. Related research activities are already under way in disciplines such as information and library science, the sociology of organizations, computer science, management science, and engineering. Given overlapping interests in several areas, the potential for building alliances among a variety of professions and interest groups is great.

The NHPRC's interest in taking a leadership role in supporting activities to answer the questions posed by new information technologies has been demonstrated in a variety of ways, not the least of which is the unanimous endorsement of this report at its June 1991 meeting. Although the NHPRC cannot, and should not, be expected to support all of the research in this area, it can promote the priorities identified for electronic records research by serving as a facilitator for multidisciplinary research by allied professions and by encouraging other Federal and state funding agencies and private foundations to sponsor or support electronic records research. As head of the National Archives and Records Administration (NARA), I can assure that NARA, specifically through its Center for Electronic Records and Archival Research and Evaluation Staff, will continue to work with others in activities that support the research agenda.

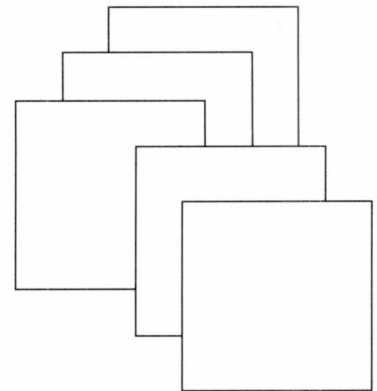
Although the publication of this report is an important step, the success of the working meeting will in the long run be measured by the projects and activities undertaken as a result. Moreover, the complexities and challenges of the rapidly changing information environment dictate that articulation of a research agenda must continue if we are to fulfill our archival mission in years to come. We must continue to review and refine the agenda in light of results and conclusions reached by the projects and activities undertaken because of it. Through this agenda, we must seize the opportunity to chart a course toward better policies, programs, and methods for managing and preserving our documentary heritage.

—DON W. WILSON  
ARCHIVIST OF THE UNITED STATES



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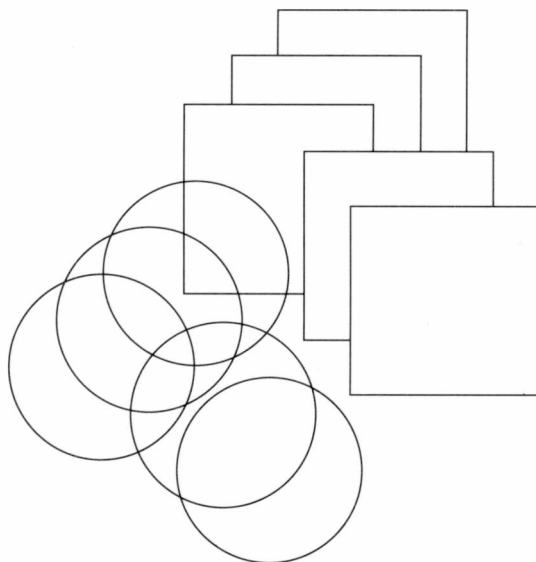
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*Report of the Working Meeting*

*Research Issues  
in  
Electronic Records*



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## Introduction

On January 24-25, 1991, forty-six individuals from a variety of disciplines gathered in Washington, D.C., for the Working Meeting on Research Issues in Electronic Records. The intent of the meeting, sponsored by the Minnesota Historical Society and funded by a grant from the National Historical Publications and Records Commission (NHPRC), was to:

- identify issues
- describe research opportunities, methodologies, and projects
- determine priorities for projects contributing to the better management of archival information in electronic form

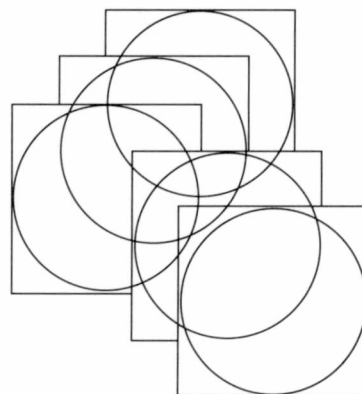
In short, meeting participants were to examine issues related to the identification, preservation, and long-term use of electronic records and to produce a national agenda for research in the archival management of such records. The meeting was organized by a planning committee composed of Lila Goff of the Minnesota Historical Society, David Bearman of Archives and Museum Informatics, Margaret Hedstrom of the New York State Archives and Records Administration, John McDonald of the National Archives of Canada, and Lisa Weber, a member of the NHPRC staff.

## Background

When the U.S. National Archives was established in 1934, the Federal government had been creating machine-readable records for forty-four years.<sup>1</sup> The Bureau of the Census inaugurated the use of punched cards “read” by a mechanical tabulating device in 1890 to process part of the Decennial Census returns.<sup>2</sup> Undoubtedly unforeseen in 1890, the shift from manual systems to electronic recordkeeping continues today at a rapid pace in both public and private sectors. An estimated 75 percent of all Federal transactions will be handled electronically by the year 2000.<sup>3</sup> Increasingly, information of enduring value is being created, maintained, and stored in electronic formats.

Archivists have been accused of failing to grasp the significance of information in electronic form.<sup>4</sup> The establishment of this pattern can be traced to the year 1936, when the National Archives issued a policy on the disposition of punched cards, stating that punched cards could be destroyed because they duplicated summary reports produced on paper. Not until 1968, in response to concerns voiced by the Social Science Research Council’s Committee

## Report of the Working Meeting



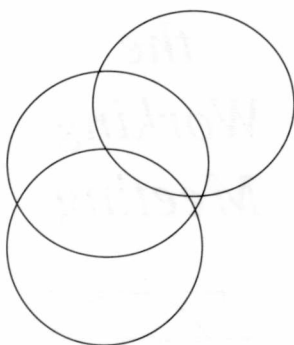
1. The terms *computer-readable*, *machine-readable*, and *electronic* are used interchangeably.

2. Charles Dollar, “Machine-Readable Records of the Federal Government and the National Archives” in *Archivists and Machine-Readable Records*, ed. Carolyn L. Geda, Erik W. Austin, and Francis X. Blouin (Chicago: Society of American Archivists, 1980), 79-88.

3. U.S. Congress, House of Representatives, Committee on Government Operations, *Taking a Byte Out of History: The Archival Preservation of Federal Computer Records*, House Report No. 101-987 (Washington, D.C.: U.S. Government Printing Office, 1990).

4. Dollar, “Machine-Readable Records of the Federal Government,” 79.





on the Preservation and Use of Economic Data, did the National Archives establish its first Data Archives Staff.<sup>5</sup> Twenty years later, only a handful of other government electronic records programs have been established, most notably at the National Archives of Canada, the Kentucky Department for Libraries and Archives, and the New York State Archives and Records Administration. There has been some work with electronic records in other areas, such as at Pennsylvania State University, but most efforts have been at the Federal and state government levels. Nonetheless, the years of experience that a small coterie of archivists has gained in acquiring, preserving, and providing access to electronic records should not be overlooked.

The techniques developed by archivists reflect the centralized, ubiquitous mainframe computing environments of the 1960s through the early 1980s, in which data-processing applications involved batch processing of files stored on magnetic tape that could be transferred to archival repositories in software and hardware-independent formats with relative ease. Subsequent dramatic changes in information technology have created electronic records and systems far more complex than those produced by the older, simpler forms of data processing. Newer software-dependent data formats such as relational databases, Geographic Information Systems (GIS), Computer-Assisted Design (CAD) systems, and hypermedia pose very different problems for archival preservation. Perhaps more significantly, advances in personal computing, telecommunications, and networking are changing the way people communicate and thus the very nature of the archival record.

Periodically, reports calling attention to the increasing prevalence of electronic recordkeeping and its potentially detrimental effect on the nation's documentary heritage have been issued. These reports tend to focus on public records generated by the Federal government and recommend that archivists develop appropriate solutions.<sup>6</sup>

The most recent example is *Taking a Byte Out of History: The Archival Preservation of Federal Computer Records*, a report from the House Committee on Government Operations, which questioned the National Archives and Records Administration's (NARA) ability to preserve current and future archival information in electronic form. That report made a number of recommendations that would enable NARA to confront more successfully that challenge. Although charges of inadequacy tend to be directed at the Federal government, the National Archives should not be viewed in isolation. Archival repositories responsible for state and local government records, college and university records, and public and private corporate records face identical challenges and are searching for appropriate solutions as well. One of the first sources that archival repositories turn to for funding support for projects confronting the archival and historical professions is the National Historical Publications and Records Commission.

5. Committee on the Records of Government, *Report* [sponsored by the American Council of Learned Societies, the Social Science Research Council, and the Council on Library Resources] (Washington, D.C.: n.p., 1985), 25.

6. For example, the Committee on the Records of Government stated that "[t]he danger of losing historically valuable records is greatly increased by the changeover to electronic recordkeeping." *Ibid.*, 10.

The NHPRC is a fifteen-member statutory body, authorized to undertake a wide range of activities relating to preserving and making accessible the documentary sources of the history of the United States. The NHPRC, affiliated with the National Archives and chaired by the Archivist of the United States, supports projects undertaken by state and local government agencies, nonprofit organizations and institutions, and individuals.

The NHPRC's active interest in soliciting grant applications that focus on archival electronic records issues can be traced to several recent events. The 1989 National Academy of Public Administration's (NAPA) study, *The Effects of Electronic Recordkeeping on the Historical Records of the U.S. Government*, included two recommendations speaking directly to the NHPRC.<sup>7</sup> The NAPA panel recommended:

1. that the National Archives increase its outreach, especially to non-Federal entities that are struggling with the same electronic records problems as the National Archives
2. that the NHPRC provide more grants for research on electronic record-keeping in the larger community outside the Federal government

In addition, the National Association of Government Archives and Records Administrators' (NAGARA) Advanced Institute for Government Archivists, held at the University of Pittsburgh School of Library and Information Science, concluded that "[t]he archival management of electronic records is probably the most important, and certainly the most complicated, issue currently before the archival profession."<sup>8</sup>

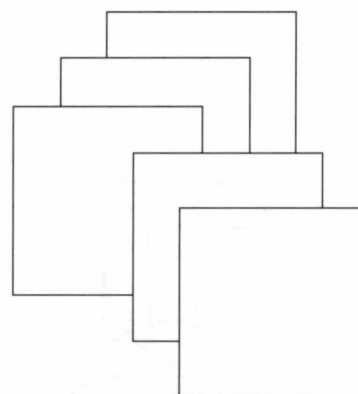
Prompted by these activities, the NHPRC charged its Records Program staff to develop a paper exploring the archival issues related to electronic recordkeeping.<sup>9</sup> That paper, *Electronic Records Issues*, was presented to and endorsed by the NHPRC at its February 1990 meeting. Discussion at that meeting focused on what measures the NHPRC could take to encourage submission of project proposals that, if funded, would serve as a catalyst to electronic records program development and benefit a broad spectrum of archival and records programs. Members of the staff suggested that, as a first step, the NHPRC support a national planning effort to develop a research agenda by describing useful potential research projects and identifying project priorities. At the NHPRC's June 1990 meeting, the Minnesota Historical Society received funding to support a working meeting in January 1991, which led to the preparation of this report.

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7. National Academy of Public Administration, *The Effects of Electronic Recordkeeping on the Historical Records of the U.S. Government: A Report for the National Archives and Records Administration* (Washington, D.C.: NAPA, 1989).

8. National Association of Government Archives and Records Administrators, *Archival Administration in the Electronic Age: An Advanced Institute for Government Archivists* [cosponsored by the School of Library and Information Science, University of Pittsburgh, and funded by the Council on Library Resources] (Pittsburgh: NAGARA, 1989 and 1990).

9. National Historical Publications and Records Commission, *Electronic Records Issues: A Report to the Commission, Commission Reports and Papers #4* (Washington, D.C.: National Archives and Records Administration, 1990).

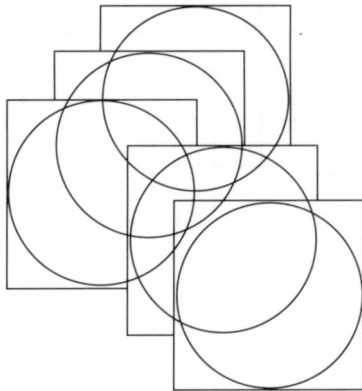


## *The Meeting*

The meeting brought together representatives from archival, historical, and records management organizations, experts from a variety of related disciplines, and archivists interested in undertaking projects in those areas.<sup>10</sup>

As chair, Lila Goff presided over the two-day working meeting, which was structured to accommodate both large and small group sessions. An opening plenary session featured two speakers who set the stage for discussions concerning research direction and methodology. Margaret Hedstrom presented a framework for a research agenda on electronic records. Tora Bikson, of the Rand Corporation, spoke on methodological problems and approaches.

Hedstrom's paper, "Understanding Electronic Incunabula: A Framework for Research on Electronic Records," established six tenets for developing research proposals on electronic records and modern information systems:



1. The goal of archival research on electronic records issues is to develop generalized policies, practices, methods, and applications for the management, preservation, and dissemination of electronic records.
2. Research on electronic records issues should anticipate technological trends rather than react to them.
3. Research on electronic records issues must account for the social, economic, and political aspects of organizational life that influence how information technologies are adopted and used by organizations.
4. Research on electronic records issues can build on what records managers and archivists already know about organizational information handling practices because changes in information handling practices are evolutionary in nature.
5. More research should be interdisciplinary and draw on conclusions reached by other fields.
6. A research agenda must recognize that resources—expertise, funding, power to influence, and response time—are limited. Therefore, an agenda should try to maximize the effective use of these resources.

Bikson's paper, "Research on Electronic Information Environments: Prospects and Problems," defined research as "procedures for the systematic reduction of uncertainty." She stressed that the electronic information environment represents a new field of inquiry that lacks ready-made solutions to research problems. She then described the nature of research desirable for this environment as consisting of asking good questions (research hypotheses), involving interdisciplinary teams, and using multiple research methods. Bikson used illustrations drawn from her own research. She concluded by describing contributions that archivists and records managers could make to research on electronic information technology and its uses and impact:

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10. Richard Cox acted as the meeting recorder. See Appendices A-C for the meeting agenda, a list of participants, and more detailed meeting proceedings.

- formulating research questions aimed at understanding the characteristics of electronic documents and communications as records
- developing procedures for gathering, classifying, analyzing, and interpreting data representing electronic information
- participating in innovative trial approaches to the long-term management of electronic information by individuals and organizations

After presentation of the papers, a panel consisting of Clifford Lynch of the University of California, Charles Dollar of the National Archives and Records Administration, and J. Timothy Sprehe of the United States Office of Management and Budget discussed the papers and needed research on electronic records. The panelists' remarks were followed by an open discussion of the meeting participants.

In the afternoon, participants convened in four preassigned task groups to examine research questions reflecting the concerns submitted by the archives, historical, and records management communities in response to the meeting notice. The planning committee had earlier consolidated these questions for division among the task groups according to social/political, organizational, economic, and technological concerns.

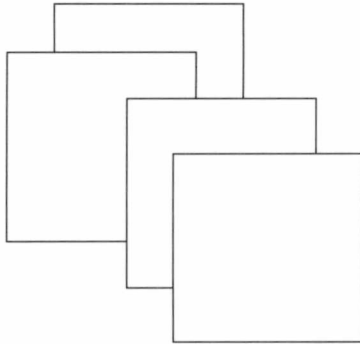
Each task group, led by a member of the planning committee, examined eight to twelve research questions designed to provide a framework for the discussion. The groups modified, deleted, or reformulated the questions, examined the potential impact of research on the questions, established priorities for projects within their domains, and developed criteria for evaluating the significance of the project proposals.

On the second day participants worked in the task groups to develop more thoroughly ideas for potential projects that would answer the research questions. In the late afternoon the entire meeting reconvened to hear David Bearman provide comments and observations about the meeting. The planning committee and meeting recorder Richard Cox convened the next day to review the task groups' work and organize the final report.



## ***Recommendations***

Task groups at the meeting developed proposals for fifteen research and development projects. The planning committee recognized that several of these projects did not involve research but were analysis, advocacy, or action activities instead. The committee revised the task group suggestions, combined them into ten questions constituting the research agenda, and discussed related activities. Archivists must undertake these four categories of activities to confront successfully the management of archival electronic records:



- 1. Analysis:** Projects that analyze the nature and significance of electronic records management problems, especially to determine how these problems affect specific constituencies (such as historians, the press, scientists) and the general public. Such projects could result in white papers and other products that increase awareness of electronic records problems and build support for effective solutions.
- 2. Advocacy:** Projects that result in initiatives for organizing, coordinating, attracting funding, and providing leadership for electronic records management research and program development. Projects might include a feasibility study for a national institution or development of effective mechanisms to raise general awareness about electronic records issues.
- 3. Action:** Challenge grants to institutions to establish basic archival electronic records capabilities and to launch programs for the effective management of archival electronic records in their jurisdictions. More archivists must gain experience in preserving archival information in electronic form before the profession can develop more sophisticated methods of handling increasingly complex technologies. There is a pressing need for the preservation of electronic data that archivists already know how to preserve.
- 4. Research and Development:** A systematic program of research, based on priority projects outlined by participants in the meeting and refined by the planning committee. The planning committee feels strongly that the NHPRC could provide leadership on electronic records issues by:
  - establishing priorities in specific areas of electronic records research for the funding it administers
  - facilitating multidisciplinary research with allied professions
  - encouraging other Federal funding agencies and private foundations to sponsor or support electronic records research

Because the meeting focused on research issues and the committee considered additional research essential for effective electronic records program development, the remaining recommendations address research questions and proposals developed at the meeting. The working meeting nevertheless urged the NHPRC to fund analysis, advocacy, and action activities as well. The order of such activities is not critical, but increased awareness of electronic recordkeeping problems and the establishment of programs to address them will support accomplishment of the research agenda.

## ***Research and Development Projects***

The planning committee believes that answers to the ten research questions addressed below are key to significant advances in policies, approaches, and programs for the management and preservation of archival electronic records. They are not the only questions, and they are not easy questions to answer. Nevertheless, the planning committee recommends that research and development efforts during the next few years focus on these issues as a way of developing greater knowledge of electronic records and demonstrating the value of research in this area.

The planning committee also believes that the questions on the research agenda allow considerable flexibility for individuals and institutions to build research and development proposals. Involvement from a wide variety of disciplines and institutions would be most useful.

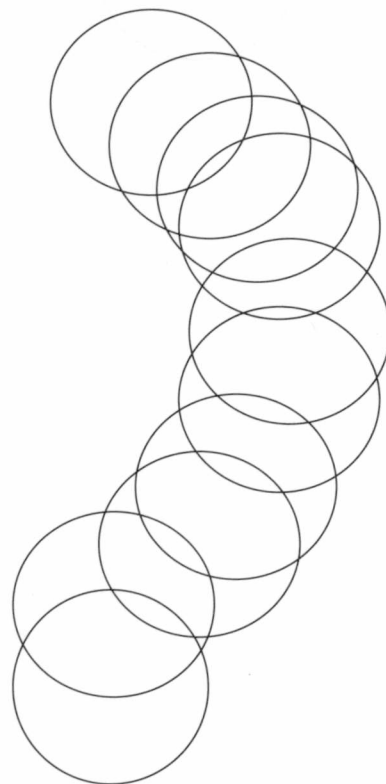
The following discussion of the research questions includes “possible approaches” to electronic records research. The proposed approaches, however, are neither the only nor always the best ways to address research issues. Creative and innovative approaches that rely on archivists and records managers to formulate useful questions and to propose implementations using the knowledge and skills of experts in allied disciplines are especially encouraged. Single institutions are not necessarily expected to assume responsibility for an entire project but may join with other institutions to study or develop one aspect of a project. The NHPRC should encourage small projects that can contribute answers to some of the broader research problems and issues and charge the Records Program staff with the coordination of proposals and projects.

The order in which the questions are addressed is important. Specifically, progress on the first three questions should precede major projects addressing the last seven questions. This is because the first three projects will define the requirements of archival electronic records programs; explore the conceptual, economic, and technological constraints on the long-term retention of electronic records; and establish criteria against which to measure the effectiveness of policies, methods, and programs.

Research on the first three questions is required before sound methods can be developed for addressing the subsequent issues. The order in which the last seven questions are addressed is not as critical.

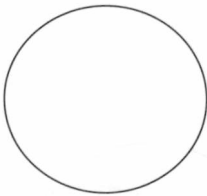
These are the ten questions, discussed in detail on the pages following:

1. What functions and data are required to manage electronic records in accord with archival requirements? Do data requirements and functions vary for different types of automated applications?
2. What are the technological, conceptual, and economic implications of capturing and retaining data, descriptive information, and contextual information in electronic form from a variety of applications?
3. How can software-dependent data objects be retained for future use?
4. How can data dictionaries, information resource directory systems, and other metadata systems be used to support electronic records management and archival requirements?



5. What archival requirements have been addressed in major systems development projects and why?
6. What policies best address archival concerns for the identification, retention, preservation, and research use of electronic records?
7. What functions and activities should be present in electronic records programs and how should they be evaluated?
8. What incentives can contribute to creator and user support for electronic records management concerns?
9. What barriers have prevented archivists from developing and implementing archival electronic records programs?
10. What do archivists need to know about electronic records?

### ***Question 1***



***What functions and data are required to manage electronic records in accord with archival requirements? Do data requirements and functions vary for different types of automated applications?***

**Area of Research:** Electronic recordkeeping and archival requirements.

**Purpose:** Define a generalized model of the activities and data necessary in managing electronic records to meet archival requirements.

**Background:** A clear understanding of the tasks, activities, and data required for the effective management of electronic records would form the foundation for electronic records policies and practices in governments and institutions. Statement of such would be built on a rigorous and systematic analysis of the tasks and data involved in managing electronic records so that archival records are captured, identified, described, retained, and made accessible. The results of such an analysis would then be used to build a generalized model for electronic records management. Developed in two parts, it would define the functions, tasks, and data necessary to manage electronic records in a variety of systems applications environments.

Archivists and records managers must determine who is responsible for specific electronic records management functions and the circumstances under which these functions might be carried out. This could be accomplished by studying and describing the process of electronic records management and developing an electronic records management process model. The model would identify functions to be performed in meeting archival requirements, as well as who would perform them and when in the records life cycle they would be performed. For example, such a model might indicate which electronic records management functions should be developed as utilities of automated systems, which should be part of specific application developments, which involve policy development and promulgation by management, and which require actions by users.

Archivists and records managers must also have a model of the specific data about systems and applications necessary to meet archival requirements.

A project might define such data requirements, determine whether and where such data exist, and specify how such data should be used to manage electronic records. This analysis would be used to build an electronic records management information model.

The two models would be then merged into one generalized model. These questions apply for each:

- What electronic records management functions must be carried out by users, management, systems, and applications?
- Who should perform the tasks necessary for electronic records management?
- What types of data must an electronic records management model address (structured, unstructured, observational data, images, compound documents, audiovisual, relational, GIS, hyperdocuments)? Can one generalized model apply to and be implemented for all data types?
- What are the primary functional characteristics of an automated system that effectively manages electronic records?

Some work is already under way. The National Archives, through its Electronic Records Strategy Working Group, is pursuing the development of functional requirements in conjunction with representation from the non-Federal sector. And the United Nations (U.N.) Administrative Committee for Coordination of Information Systems Technical Panel on Management of Electronic Records is pursuing the development of functional requirements for the management of electronic records systems with U.N. corporate bodies. Any proposed project must take this work into consideration.

**Possible Approaches:** One project might be comprised of four stages:

1. Analyze the life-cycle management of electronic records in different applications environments to develop a generalized model based on the bulleted questions above.
2. Verify this model through discussion with the archives and records management communities, creators, and design and user communities.
3. Validate the model with a rigorous proof of concept in a variety of settings (distributed/stand-alone, governmental/educational, individual/corporate, and so forth).
4. Disseminate the validated model to archives and records management communities for acceptance as a professional standard.

**Result:** A generalized model for electronic records management functional requirements.

**Resources:** A necessarily collaborative project, this requires individuals from several disciplines including information systems analysis, archives, and records management. The project might be divided among principals from several institutions, each to develop, test, and validate the model in a particular applications environment.

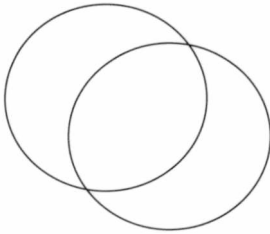


**Benefits:** The projects would produce a formal statement of requirements for management of electronic records in a variety of applications. This would be a key element for program planning and development, policy formulation, advocacy, and subsequent research.

The generalized model is essential to:

- influence or intervene in system design and implementation projects
- develop plans for electronic records programs
- define archival objectives for information technology standards development
- define criteria for success in system design and electronic records management programs
- determine knowledge and skill requirements for curriculum development, education, and professional training
- clarify professional goals

## Question 2



***What are the technological, conceptual, and economic implications of capturing and retaining data, descriptive information, and contextual information in electronic form from a variety of applications?***

**Area of Research:** Feasibility of capture and retention of data and contextual information.

**Purpose:** Determine the technical feasibility and costs of capturing data and contextual information in electronic form from a wide range of applications.

**Background:** Archives preserve data created in the course of conducting organizational business as well as information about the context in which the data are created and used. In traditional archives this is accomplished through respect for the provenance of the records, maintenance of original order, creation of administrative histories and other finding aids, and maintenance of information about the relationships among discrete records series.

Automated information systems also capture data created in the course of organizational business and contextual information about the creation and use of data, often more so than traditional manual filing systems. Electronic mail applications, for example, capture the content of the message and such contextual information as the names and addresses of the persons who send and receive the messages, the dates and times the messages are sent, and the network path they follow. If the electronic mail is stored in a corporate filing system, the system retains information about who has permission to access the system, access points for retrieving the messages, and when and by whom they are viewed, copied, and forwarded. Many automated applications retain detailed descriptions of all data and transactions in the system, a level of contextual information not generally available from manual filing systems.

Archivists must analyze the technical feasibility and costs of preserving data and contextual information at various levels and across a variety of applications. The most common current approach to preservation of records in electronic form is to save data alone in a simple format that can be transported easily from one system to another. Archivists lack knowledge of the technical requirements for preservation of contextual information and do not know the costs and benefits associated with doing so. Archival policy for electronic records must recognize the trade-offs associated with retention of data and information at various levels.

**Possible Approaches:**

- Identify ideal levels of data and contextual information for meeting archival requirements.
- Determine the extent to which current applications and implementation environments can meet these requirements.
- Determine what organizations do now to capture and retain contextual information and why, including descriptive and contextual information maintenance in manual form.
- Identify the technological feasibility, organizational requirements, and economic costs of achieving each level of information capture. These might include storage space, conversion of data to a standard format, and development and conformance to standard policies and practices.

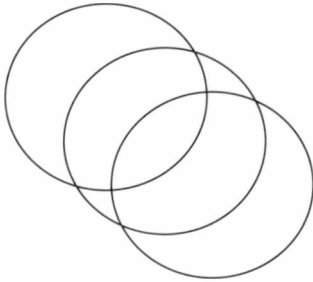
**Results:** A conceptual model and guidelines for retention of various levels of data and contextual information from a variety of applications.

**Resources:** Because it evaluates and builds on traditional archival theory, development of this model must involve and perhaps be led by one or more archivists. The knowledge of systems analysts, data processing professionals, and system vendors is also needed.

**Benefits:** The projects would provide a framework for decisions about several aspects of electronic records policy and program development such as:

- guidelines for decision-making about electronic records retention
- development of standards for migration of data to new generations of hardware and software
- the applicability of archival theory to automated information systems and the effectiveness of archival methods for determining the value of records in automated applications
- methods for estimating the costs of retaining various levels of data, descriptive information, and contextual information in electronic form

### *Question 3*



### *How can software-dependent data objects be retained for future use?*

**Area of Research:** Retention of software-dependent data.

**Purpose:** Determine methods for preserving software-dependent data.

**Background:** New information technologies such as Geographic Information Systems (GIS), Computer-Assisted Design (CAD) systems, expert systems, e-mail, database management systems, and hypermedia systems present problems for archivists because:

- they are dependent on access to software that may not be retained
- it is not clear how transactions against such systems are captured or retained or whether the transactions can be retrieved in the future
- archivists have not defined their requirements for new types of systems that specify the level of detail needed for data, data creation, and use
- available tools for retaining software-dependent data are not well understood by archivists nor are the cost and functionality trade-offs for various options understood
- variations among applications are not known

**Possible Approaches:**

- Examine specific classes of new information technologies, including but not limited to those mentioned above.
- Determine the current activities of organizations working to retain software-dependent data.
- Study the experience of organizations that are leaders in introducing new technologies to determine how they have moved software-dependent data to new hardware and software environments.
- Identify policies, techniques, standards, and practices that support long-term retention of software-dependent data.
- Follow with test implementations and tests of current products.

**Results:** Technology-specific methods for migration of software-dependent data from one generation of hardware and software to the next.

**Resources:** Work would be done by an interdisciplinary group relying heavily on software specialists with expertise in new information technologies, users of advanced applications, archivists, and records managers.

**Benefits:** The studies will:

- gather information for organizational use in defining archival policies during implementation of new technologies
- help systems designers understand and implement appropriate support for archival requirements in advanced applications
- define requirements for use by software developers

***How can data dictionaries, information resource directory systems, and other metadata systems be used to support electronic records management and archival requirements?***

***Question 4***

**Area of Research:** Metadata systems.

**Purpose:** Determine the extent to which data dictionaries, information resource directory systems, and other metadata systems could support electronic records management and archival requirements.

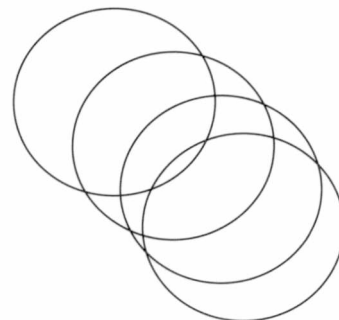
**Background:** There are many similarities between the types of information needed to describe and control archival records and those maintained by data processing organizations to control electronic records. Increasingly, these organizations use data dictionaries and information resource directory systems to describe and control the data in automated applications.

Several recent projects have explored uses of metadata systems to describe government information systems. These include NHPRC-funded projects in Kentucky and New York, activities undertaken by NARA's Center for Electronic Records, a study by Charles McClure and others on Federal information inventory/locator systems, and a National Institute of Standards and Technology report to the National Archives.<sup>11</sup> Archivists have not, however, analyzed the application of existing data dictionaries and information resource directory systems to the archival management of electronic records.

**Possible Approaches:**

- Validate the information requirements for archival electronic records management identified in Question 1.
- Analyze existing metadata systems in several organizations to determine the extent to which they support electronic records management and archival requirements.
- Identify requirements for additional data or functionality in metadata systems needed to support electronic and archival requirements.
- Determine whether such data requirements can be added to metadata systems.

**Results:** A report on the potential uses of metadata systems to support electronic records management and archival requirements and a list of proposed modifications or enhancements to current metadata systems.



11. Charles McClure, et al., *Federal Information Inventory/Locator Systems: From Burden to Benefit: Final Report to the General Services Administration Regulatory Information Service Center and the Office of Management and Budget, Office of Information and Regulatory Affairs* (Syracuse: Syracuse University School of Information Studies, 1990), and the National Institute of Standards and Technology, National Computer Systems Laboratory, *Frameworks and Policy Recommendations for the Exchange and Preservation of Electronic Records* [Prepared for the National Archives and Records Administration] (Washington, D.C.: NIST, 1989).

**Resources:** This project, which can build on the answer to Question 1 (defining the functions and data required for managing electronic records) and on recent studies of metadata systems, requires the expertise of archivists, agency or organizational database administrators, users of metadata systems, potential users of records, information resource management staff, and specialists in information retrieval.

**Benefits:** The study would:

- evaluate and compare the features of various metadata systems for supporting electronic records management and archival requirements (This assessment in turn could be used by organizations in acquiring or developing metadata systems for their own use.)
- articulate metadata systems archival requirements for use in standards development for information resources directory systems
- test the feasibility of providing remote access to electronic records through the use of metadata systems
- determine the responsibilities placed on custodians/administrators of systems in adding archival and electronic records management requirements to metadata systems
- develop techniques for exploiting metadata system capabilities to meet description requirements for archival records and improve access to electronic records
- improve the ability of records-creating organizations to manage electronic records through metadata systems
- allow archival requirements to be integrated into operational control mechanisms rather than handled through separate and redundant systems
- permit archivists to exercise control over records, including making disposition decisions and using data available from agencies
- allow archivists to control electronic records through a metadata system without having to take physical custody of the records

**Follow-up:** Future studies should examine the potential of multi-agency and multi-jurisdictional networking of metadata systems.

***What archival requirements have been addressed in major systems development projects and why?***

***Question 5***

**Area of Research:** Archival requirements and the design of information systems.

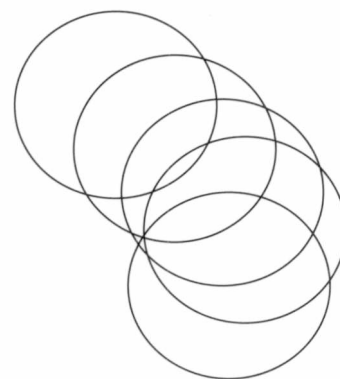
**Purpose:** Provide insights into the best methods of influencing system design efforts so that they attend to archival requirements.

**Background:** The U.S. Office of Management and Budget (OMB) has identified numerous “presidential priorities systems” involving development expenditures in excess of one hundred million dollars. Some of these systems support data transfers from local to state or state to Federal agencies. States also may have identified critical information systems from the perspective of development costs, significance for continuing state operations, or impact on large segments of the population. Institutions such as colleges and universities or private corporations often designate certain information systems as vital or essential.

Archivists do not know whether these systems have been designed to meet archival needs. If they have, much can be learned from determining why organizations included archival concerns in their system designs and how these archival requirements are being met. In systems where archival issues are not addressed, archivists will be able to document data losses and other consequences of ignoring archival requirements. Focusing on critical systems should draw attention to the significance of data loss and identify models of successful practice.

**Possible Approaches:**

- Study ten critical systems to determine the extent to which archival requirements have been considered in systems design. Use the NAPA study, OMB studies, and studies of automated systems in state governments or institutions to identify critical systems.<sup>12</sup> Select systems where much is known about predecessor manual systems so that differences between manual automated systems can be documented. In addition, select systems that represent a variety of organizational, technological, and business contexts.
- Analyze how systems meet or do not meet archival requirements in regard to type of system, age, state of technology, policy environment, and involvement of archivists in the systems design. Determine why an archival component may have been included or excluded.
- Use information to develop model policies for system development.
- Document the benefits of including archival concerns in system design and the losses of data resulting from not considering them.



12. The National Archives and Records Administration has contracted with the National Academy of Public Administration for “A Study of Major Automated Databases Maintained by Agencies of the U.S. Government.”



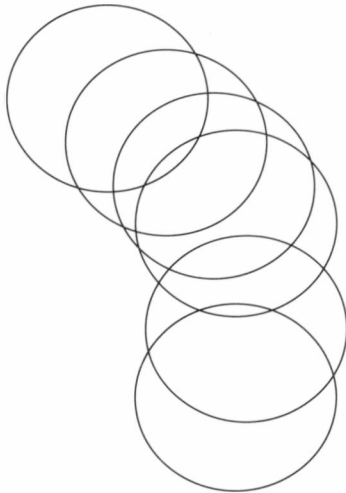
**Results:**

- a list of factors determining whether archival concerns are addressed in major systems
- examples of model policies and practices
- documentation of significant data losses

**Resources:** Projects would require the expertise of archivists, the staff in agencies supporting the systems being studied, users of archival data from the systems, and information resource managers.

**Benefits:**

- Knowledge of the degree to which critical systems meet archival requirements will provide a basis for identifying and correcting problems with key systems.
- Development of sound management practices in critical systems will provide leverage for incorporation of similar requirements and practices in smaller systems.
- Analysis of the development processes will help archivists develop a set of recommendations for measures in the design of the next generation of systems.
- Documentation of losses will help raise public awareness about archival issues in modern information systems.

**Question 6**

***What policies best address archival concerns for the identification, retention, preservation, and research use of electronic records?***

**Area of Research:** Model public and corporate policy frameworks and statements.

**Purpose:** Develop model information policy objectives and statements for electronic records management.

**Background:** Information policy becomes increasingly important as organizations depend more on electronic records and electronic communications as primary recordkeeping and communications systems. Such essential issues as the definition of a record, the delineation of responsibilities for maintenance and retention of electronic records, and the rights and conditions of access will be established in the policy arena. The Federal government, some state governments, and some private organizations are developing information policies that establish a framework for the creation, management, use, and dissemination of corporate record holdings. In the government areas, these policies must be based on appropriate laws.

Archivists have had little experience in developing or evaluating the effectiveness of such policies; and governmental and organizational policy makers do not always consult archivists and records managers when they

develop information policies affecting archival and records programs. Nevertheless, some organizations (most notably the Canadian federal government and the U.N.) have policies that could serve as a useful foundation for promoting and developing policies that support archival objectives.<sup>13</sup> Research must address issues related to the content and process of policy making:

- What are the essential elements of an electronic records management policy?
- Can policy frameworks such as those of Canada, the United Nations, Westinghouse Corporation, and cases in the medical profession be modified for adoption and use by other governments, academic institutions, or private organizations?
- What criteria can be used to measure the effectiveness of policy for the identification, retention, preservation, and use of electronic records?
- What processes have organizations or governments used successfully to develop and adopt policy? Who are the key players in the development process, and how can they be encouraged to include issues of concern to archivists, records managers, and users of archival records?
- Do organizations and individuals follow such policies once approved? What can be learned from policy implementation efforts?

#### **Possible Approaches:**

- Develop a model policy framework based on an analysis of policies in selected state governments, the U.N., and other organizations.
- Conduct tests or pilot studies to assess the feasibility of incorporating archival considerations into laws and policies (for example, test the utility of the U.N. study in other settings).
- Develop criteria for determining how effectively model policies can lead to the development of electronic records and archival programs.
- Circulate draft policies and evaluation reports for wide review.

#### **Results:**

- analyses of the impact on programs of information policies that incorporate the preservation of archival data
- model policies
- criteria for policy evaluation
- tools and strategies for advocating and contributing to the development of policies that support archival objectives

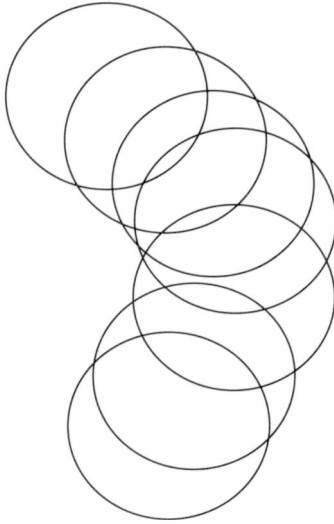
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13. United Nations, Administrative Committee for the Coordination of Information Systems, Technical Panel on Records Management, *Electronic Records Guidelines: A Manual for Policy Development* (New York: United Nations, 1989), and Treasury Board of Canada, Administrative Policy Branch, *Management of Government Information Holdings* (Ottawa: Treasury Board of Canada, 1989).

**Resources:** The knowledge of public policy experts, archivists, information management specialists, and senior program managers would be used.

**Benefits:** Model policies for implementation that result in the incorporation of archival interests and concerns.

### ***Question 7***



***What functions and activities should be present in electronic records programs and how should they be evaluated?***

**Area of Research:** Functions and activities of electronic records programs.

**Purposes:**

- develop analytical tools to help archival institutions design and evaluate electronic records programs and determine costs of these programs
- identify, within the context of a given archival institution, the functions and activities that should comprise an electronic records program

**Background:** Archivists now have insufficient baseline information to develop successful electronic records programs or select an effective approach to the identification, retention, and preservation of electronic records. Regardless of the strategy chosen, the factors and criteria that archival institutions should consider as they establish electronic records programs must be identified. These would include:

- external factors that support or impede successful program development (such as policy frameworks, program mandates, and organizational location of the archival institution)
- resources for carrying out the functions and activities of an electronic records program (knowledge and skills, technical resources, fiscal resources, access to expertise)
- evaluation criteria (factors to determine whether a program works)

**Possible Approaches:**

- Conduct surveys to identify factors serving as catalysts to the establishment of electronic records programs. These might include applications environment, jurisdictional considerations, and technical expertise.
- Generalize the results of the surveys noted above into a model for other archival institutions.
- Survey archives with existing archival electronic records programs and assess differences between services for traditional records and services for electronic records. What are the differences? Why?

- Examine steps taken by non-archival institutions (such as Exxon, the National Aeronautics and Space Administration, IBM, and Eastman Kodak) to establish electronic records programs. What factors have they considered? What analytical tools have been used to identify options for program configuration and scope? What are the costs?
- Identify the types of uses, including secondary uses, for electronic records in existing archival and non-archival electronic records programs. Include user satisfaction surveys and surveys of what other services existing users would like.

**Results:**

- a guide describing the options and requirements for successful electronic records program development in a variety of settings
- a report on the results of a survey of archival and non-archival institutions about the functions, activities, strategic directions, and goals of electronic records programs

**Resources:** Projects involve archivists and non-archivists concerned about electronic recordkeeping as well as experts in organizational development.

**Benefits:**

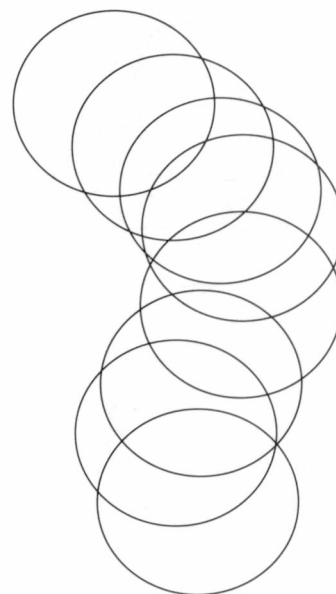
- Identification of factors and criteria for electronic systems will help institutions make decisions in establishing programs.
- Results will improve program effectiveness.
- Tools developed will support archival decision-making.

***What incentives can contribute to creator and user support for electronic records management concerns?***

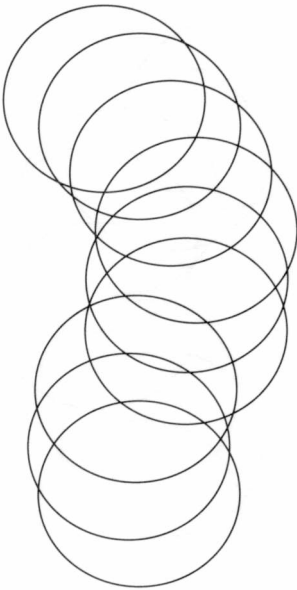
**Area of Research:** Incentives for reflecting archival considerations in systems designs and implementations.

**Purpose:** Identify incentives (economic, organizational, political) for creators of electronic records to incorporate archival requirements.

**Background:** As much as archivists complain about resistance to advancing electronic records programs, some have had success in the area. Systems development and project staff have incorporated archival considerations and requirements into the design of systems in several settings. They have met with archivists and have established working relationships leading to the development of policies and procedures ensuring that archival concerns are addressed. If these few success stories were better known, the techniques and situations might be developed into models useful to other archivists and archival institutions.



***Question 8***



### ***Question 9***

#### **Possible Approaches:**

- Conduct a survey of “successful” projects (the criteria for success must account for archival concerns throughout the systems/project life cycle, not just at the design stage). What triggers have led to success? Identify triggers applicable in many situations. Include identification of what not to do.
- Conduct focus sessions with archivists and program/project staff to elicit the factors leading to successful ventures.
- Conduct a survey to identify strategies used by archival institutions to influence the management of electronic records (involvement in information policy, information technology standards, and so forth). Determine empirically whether these strategies can be generalized for application in other situations.

#### **Results:**

- guidelines that can be integrated into the tools used to promote the establishment of electronic records programs
- communications products such as brochures and information kits

**Resources:** The project will involve people from institutions that have addressed electronic records issues, records managers, program managers, organizational psychologists, and statisticians.

**Benefits:** Concrete interventions that will improve electronic records management programs.

***What barriers have prevented archivists from developing and implementing archival electronic records programs?***

**Area of Research:** Barriers to establishment of electronic records programs.

**Purpose:** Identify the barriers preventing the establishment of archival electronic records programs and recommend ways for removing them.

**Background:** For twenty years, archivists have discussed the need for archival electronic records programs, but functioning programs are few. Why have more programs not been established? In some cases, lack of expertise, funding, skills, and planning appear to have been obstacles. In other cases, particularly those involving the promotion of electronic records management programs by archival organizations, the barriers have been raised by the institutions that might benefit from such programs.

If the barriers could be better understood, ways might be found to help archival institutions overcome them and advance their programs. The barriers must be understood from such perspectives as those of the institutions by which records are created, resource allocators, users, and archives.

**Possible Approaches:**

- Conduct focus sessions involving resource allocators and archivists to identify the barriers from a resource allocation perspective. Repeat the exercise with individuals who would normally be involved in implementing electronic records management programs. Repeat again with individuals from archives who can focus on the barriers that inhibit the establishment of archival electronic records programs because of resistance from within.
- Conduct a survey of electronic records programs and archival institutions that have tried to identify common barriers and challenges.
- Test various scenarios for overcoming the barriers.

**Results:**

- a checklist of barriers for archival institutions to avoid or overcome as they begin to build electronic records programs
- suggestions for surmounting barriers
- a definition of requirements for further research

**Resources:** Research might involve resource allocators, archival administrators, archivists, systems and program managers, and clients.

**Benefits:**

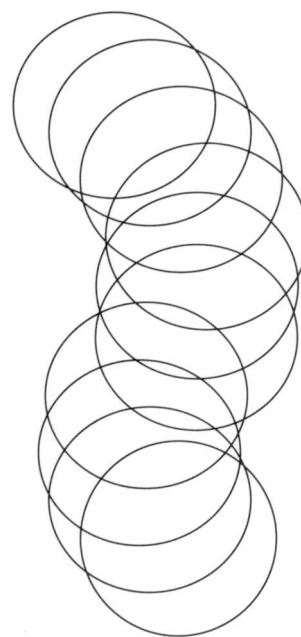
- Understanding the barriers will help archives build strategies for the removal of barriers and the development of more effective programs.
- Understanding barriers will help funding agencies make realistic determinations for the success of electronic records management programs.

***What do archivists need to know about electronic records?***

**Area of Research:** Knowledge required to establish archival electronic records programs.

**Purpose:** Identify the knowledge and skills required by archivists at various levels and settings that will enable archival institutions to establish and maintain archival electronic records programs.

**Background:** While several archival education programs exist, few incorporate modules responding to the needs of archivists concerned about the impact of electronic recordkeeping. What kinds of information do archivists need to develop and sustain archival electronic records programs? Must they be experts in information technology? What should they know about the tools, techniques, and policies employed in managing electronic records? What skills should the administrators of archival programs acquire so that their institutions may address electronic records concerns? How should

***Question 10***



electronic records education programs be incorporated into education programs supported by the archival and other relevant communities (for example, information systems, records management, and program management)?

**Possible Approaches:**

- Use the curriculum of the Society of American Archivists' Committee on Automated Records and Techniques as a building block in a comprehensive education program for archivists.
- Analyze the NAGARA/University of Pittsburgh Advanced Institute for Government Archivists for generalization of its structure and content and adoption into other archival education programs.
- Review the literature, including project reports, to determine appropriate curriculum content.
- Conduct interviews with leading electronic records experts to identify the skills and knowledge that archivists need.
- Follow up with interviews of archival and other educators to determine how existing and/or proposed education programs might incorporate electronic records modules.

**Results:**

- education curricula
- checklists of training and professional development items that should form part of the professional development program of archival institutions (such as for new archivists or archivists being groomed to advance archival institutions' electronic records programs)

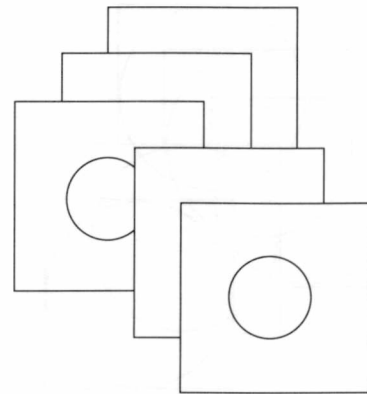
**Resources:** Projects would involve archival educators, electronic records experts, and educators from relevant disciplines.

**Benefits:** Integration between research, education, and practice.

## ***Criteria for Project Evaluation***

The working meeting urged the adoption of the following criteria for the solicitation and evaluation of proposed projects. The order of the criteria does not reflect their importance, and the criteria should be applied with flexibility depending on the nature of the proposals. The planning committee suggests that these criteria be cited in public invitations to submit proposals for funding electronic records management research. Projects should:

- be suitable for support from multiple funding and institutional sources
- build on prior work
- be multidisciplinary in conception and execution
- produce usable models or have generalizable results
- apply, evaluate, or modify existing archival principles
- produce recommendations that, if adopted, would benefit archival management or users of archival records
- consider political and policy implications
- determine costs, benefits, and other economic impacts
- identify mechanisms required for widespread implementation
- be published in the professional literature (Reports on results should be placed in the Archives Library Information Center (ALIC) of the National Archives. The NHPRC should fund publication and other mechanisms for dissemination, where appropriate.)



## Conclusion

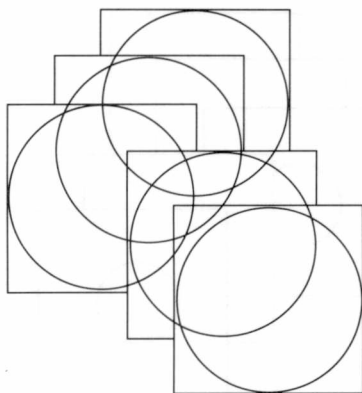
Finding practical solutions to the goal of long-term preservation and use of archival information in electronic form is a significant, urgent, and complex issue. Participants spent two days identifying research questions and priorities in an effort to develop possible approaches to accomplish this goal.

Although the ten research questions are the core of this report, the establishment of analysis, advocacy, and action tasks recognizes critical areas of concern that will support accomplishment of the research and development agenda. The ten criteria for project evaluation are equally important and must be used to assess the extent to which individual project proposals merit funding. The criteria cover several issues: support, the composition of research teams, analysis of specific factors, and the form and distribution of the results. The meeting's emphasis on research methodologies indicates that archivists working on these projects must ask thoughtful and well-articulated questions and incorporate appropriate methods to answer those questions.

Standards development and use have been cited as key strategies for archivists to use in fulfilling archival electronic records management responsibilities. Yet no research project in the agenda focuses specifically on standards. The planning committee has concluded that the profession must systematically analyze and define its functional requirements before it spends resources developing specific standards. Once projects answering the first three questions define the requirements, resources may be expended on developing specific standards.

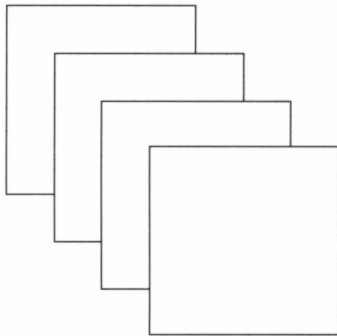
The level of resources this research agenda will require has not been explicitly addressed. Although some task groups tried to estimate personnel, time, and other requirements for projects, the planning committee has concluded that this is not a particularly useful exercise. Project descriptions are too general at this point to support the projection of costs, and projects may be undertaken through many different methods. Still, the planning committee expects most proposals to request amounts from the NHPRC ranging from \$50,000 to \$300,000, which would not be excessive for projects of national significance. At the same time, requiring that the projects be suitable for support from multiple sources will enable projects to combine sources and raise funds sufficient to the tasks at hand.

The nature of information in electronic form—rapidity of technological change, built-in obsolescence, fragility of the medium, and system dependency—requires that archivists undertake planning to ensure long-term preservation and access. Unlike paper records, which can be neglected for some time with minimal deterioration, assessment for preservation of information in electronic form cannot take place retrospectively. Meeting participants have been well aware the archivists must abandon a traditionally reactive posture and embrace one anticipating change. Indeed, the purpose of the meeting was to develop a forward-thinking research agenda that will provide the profession with tools to accommodate long-term preservation and use. At the same time, attendees agreed that the result of research must translate into achievable archival electronic records management programs. Providing future access to information in electronic form depends upon successfully meeting these challenges.



## *Appendices*

Appendix A  
*Agenda*



***Thursday, January 24, 1991***

- |       |  |
|-------|--|
| 8:30  | Registration   |
| 9:00  | Plenary Session<br>Welcome and Introductions<br><i>Lila Goff, Chair</i><br><i>Don W. Wilson</i>  |
| 9:30  | “Understanding Electronic Incunabula: A Framework for Research on Electronic Records”<br><i>Margaret Hedstrom</i><br>“Research on Electronic Information Environments: Prospects and Problems”<br><i>Tora Bikson</i> |
| 10:30 | Break  |
| 11:00 | Panel and Open Discussion<br><i>Clifford Lynch</i><br><i>Charles Dollar</i><br><i>J. Timothy Sprehe</i>  |
| 12:15 | Explanation of Task Group Sessions<br><i>Lila Goff</i>   |
| 12:30 | Lunch  |
| 1:45  | Task Group Sessions  |
| 5:30  | Reception  |

***Friday, January 25, 1991***

- |       |  |
|-------|--|
| 8:30  | Plenary Session<br>Reports by chairs of task groups:<br><i>David Bearman</i><br><i>Lila Goff</i><br><i>Margaret Hedstrom</i><br><i>John McDonald</i> |
| 9:30  | Task Group Sessions  |
| 12:00 | Lunch  |
| 1:00  | Continued Task Group Sessions  |
| 3:00  | Break  |
| 3:30  | Plenary Session<br><i>Lila Goff</i><br>Summary by chairs of task groups to entire group<br>Summary of meeting<br><i>David Bearman</i>                |

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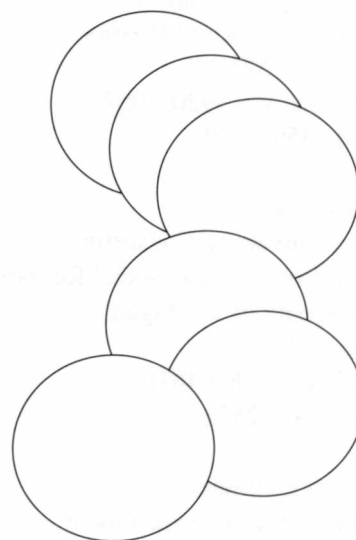
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## *Appendix B*

# *Participants*





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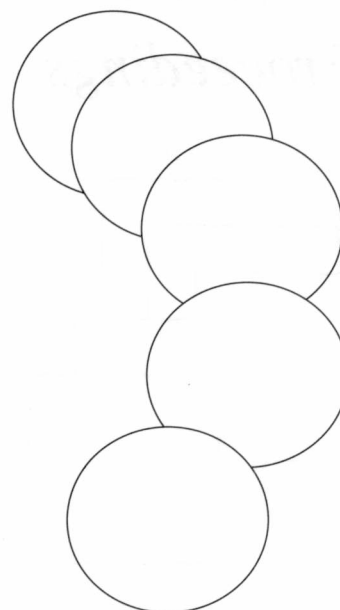
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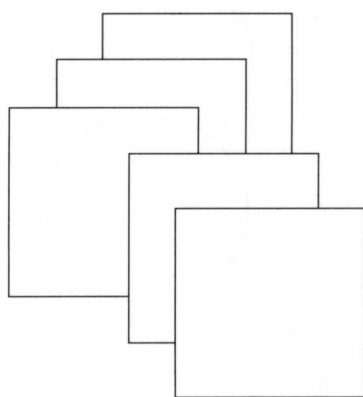
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## Appendix C

# Proceedings



### Day 1

Chair Lila Goff, Minnesota Historical Society, convened the Working Meeting on Research Issues in Electronic Records on January 23, 1991, at the Omni Georgetown Hotel in Washington, D.C. The purpose of the meeting was to identify issues, describe research opportunities, methodologies, and projects, and determine priorities for projects that will contribute to better management of electronic records for long-term preservation and use. Archivist of the United States Don Wilson welcomed the participants and provided background on events leading to the meeting. To set the stage for discussion about research direction and methodology, Margaret Hedstrom, New York State Archives and Records Administration, and Tora Bikson, Rand Corporation, presented two papers.

Hedstrom's paper, "Understanding Electronic Incunabula: A Framework for Research on Electronic Records," proposed an agenda first formulated when she was a recipient of a Mellon/National Endowment for the Humanities Fellowship in Modern Archives at the Bentley Historical Library, University of Michigan. She first explained the title of her paper, suggesting that electronic records are in an early stage of development and in an early stage of impact on documentation and communications, as well. She also explained her view that the changes wrought by electronic information systems will be evolutionary.

Within that framework, Hedstrom presented six basic tenets for developing research proposals on electronic records and modern information technology systems:

1. The goal of archival research on electronic records issues is to develop generalized policies, practices, methods, and applications for the management, preservation, and dissemination of electronic records.
2. Research on electronic records issues should anticipate rather than react to technological trends.
3. Research on electronic records issues must account for the social, economic, and political aspects of organizational life that influence how information technologies are adopted and used by organizations.
4. Research on electronic records issues can build on what records managers and archivists already know about organizational information handling practices because changes in information handling practices are evolutionary in nature.
5. Research must be interdisciplinary and draw on conclusions reached by other fields.
6. A research agenda must recognize that resources—expertise, funding, power to influence, and response time—are limited and maximize the effective use of those resources.

Hedstrom explained each of these tenets and concluded with a challenge to the archives profession not to ignore the need for studying technology, communications, and documentation.

Bikson then presented a paper on "Research on Electronic Information Environments: Prospects and Problems." She first discussed the nature of research, defined as procedures for the systematic reduction of uncertainty that employ empirical methods, consider social and technological issues, and gather findings applying to individuals and groups in organizations. She stressed that the electronic information environment represents a new field of inquiry that lacks ready-made solutions to research problems. She described the nature of research necessary in that environment, saying it must:

- ask good questions (research hypotheses)
- involve interdisciplinary teams
- use multiple research methods

To make her point, Bikson described her own research, which examined the impact of information technology on offices. She provided an introduction to how the research hypotheses were formed, how multiple data collection methods were employed, and how the interdisciplinary team functioned.

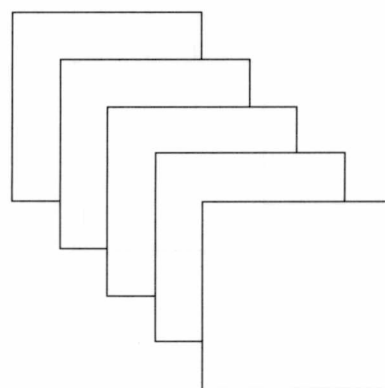
Bikson concluded by describing what archivists and records managers could contribute to research about electronic information technology and its uses and impact:

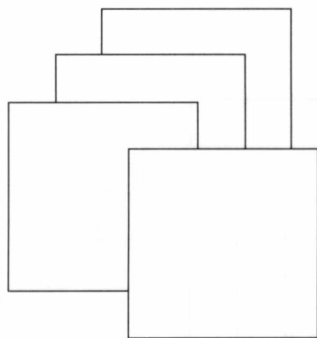
- formulating research questions aimed at understanding the characteristics of electronic documents and communications as records
- developing procedures for gathering, classifying, analyzing and interpreting data representing electronic information
- participating in innovative trial approaches to the long-term management of electronic information at individual and organizational levels

After their presentation, a panel of experts in library and information science, archives, and information policy discussed the two papers and electronic records research issues. Panel members were Clifford Lynch of the University of California, Charles Dollar of the National Archives and Records Administration, and J. Timothy Sprehe of the United States Office of Management and Budget (OMB).

Clifford Lynch observed that archivists share common cause with librarians and records managers, who are grappling with the same issues and challenges posed by electronic records and information technology. He suggested that the short lifespan of current electronic information systems is leading to a form of recurring organizational amnesia as old data are periodically lost. Drawing on thoughts from Hedstrom's paper, he suggested that addressing these issues requires archivists to take an active role in system requirements definition and design.

Organizations are making decisions based on databases and computer models. The archival function requires that snapshots of database content and audit trails of who accesses electronic systems and when and what is retrieved in turn be made retrievable. Most current technology does not support these functions; Lynch mentioned research in "time travel" databases, where one can query a database as it has existed at an earlier point in time.





He also observed, in reaction to the Hedstrom paper, that archivists cannot physically bring electronic records into their repositories as they have done with other kinds of records. This means, according to Lynch, that archivists must move into the policy realm.

Lynch also suggested that “by-products” of massive electronic information systems such as credit card records held by large commercial organizations outside the domain of government information and archives policy are a vital but unaddressed source of information.

If we are to deal with “living” archives that hold electronic records of vital interest to the general public and to policymakers, access is a key consideration, he noted. Who will have access, and how? And what will it cost? Finally, Lynch suggested that the term *research*, as discussed in the papers by Hedstrom and Bikson, is too limited. Archivists must consider innovation-controlled enterprise-wide development of technology to well-defined ends. Further, they must persuade specific organizations that the research agenda of archivists and records managers not only is important on its own but also is tied closely to other, nontraditional forms of research that may be directly concerned with the mission and goals of those organizations.

Charles Dollar was the next commentator. He began by asking these two questions:

1. What is the information technology context that needs to drive research about the management of this technology and its products?
2. What is good research?

To him, these seemed to be the main questions asked by Bikson and Hedstrom. Bikson is quite right, Dollar said, to focus on the present and past (and not on the future) to frame a research agenda for information technology issues. He noted, however, that archivists and records managers are not accustomed to using the rigorous research methodology laid out by Bikson. Dollar did not think that all of the research described by Bikson must be done directly by archivists, but rather that archivists must ask the right questions—there’s the challenge—to be taken up by other researchers.

Dollar then turned to the Hedstrom paper, praising it for its own research and for the agenda it suggested. Although he agreed with the premise of Hedstrom’s agenda, Dollar disagreed with the paper’s major thrust, as reflected in its use of the term *incunabula*. The term there represented two centuries of change, as characterized by Elizabeth Eisenstein in her book on the early history and impact of printing in Europe.\* He challenged, first, the idea of a gradual, evolutionary change of information technology that results from looking at the book as a paradigm. Dollar said we are still in the early periods of such change and that it is difficult even to know how to view the “computer revolution.” He believes we must look at technological changes that have been more rapid, such as the adoption of carbon paper in two decades at the turn of this century. Second, he disagreed with the premise that archivists can have a major impact on information technology. Dollar

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\* Elizabeth Eisenstein, *The Printing Press as an Agent of Change* (Cambridge: Cambridge University Press, 1979).

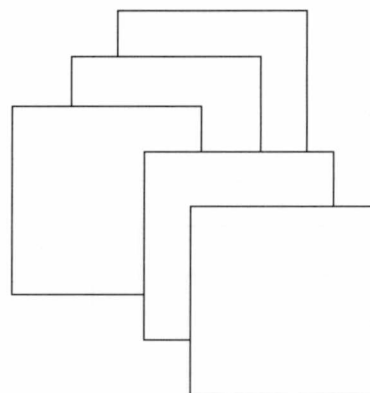
believes, instead, that the marketplace, which is outside the realm of the archivist or records manager, drives the nature and use of technology, Third, he questioned whether archivists can have sufficient influence on information technology standards and whether standards are enough. Fourth, Dollar suggested that the emergence of social science data archives not be considered a model for how archivists can influence and work with electronic records because such archives have been developed because of revolutionary changes in use. Access, not preservation or other more traditional concerns of archivists or records managers, drove their development.

Dollar concluded that archivists do need a research agenda on electronic records but not the kind of multidisciplinary, global research agenda proposed by Hedstrom. He would like to see, instead, research projects focused on discrete research questions oriented to the needs of archival organizations, projects that could be finished in eighteen to twenty-four months. Archivists and records managers must find the capacity to scan rapid changes in the realm of information technology and to keep pace with those changes.

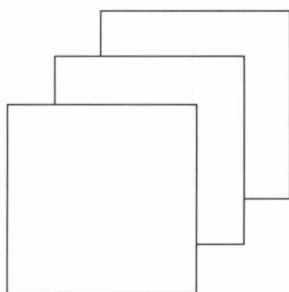
J. Timothy Sprehe was the last speaker on the panel. His organization's (OMB's) interest in research is related to the Federal government's need for policy concerns, characterized by Sprehe as being what an agency should do. He expressed interest in research results that can translate into policy, into motivating agencies to care for their archives and to manage their records and information systems well. He indicated that the utility of good archives and records management operations must be demonstrated to agencies.

Sprehe was less concerned with the theoretical implications of research as discussed at the meeting so far, providing instead an example of the kind of research questions in which the OMB is interested. Many Federal agencies, like the Patent Office and the Internal Revenue Service, have large automated filing systems, he said. These systems often lead to the saving of many electronic files, but disposition decisions are individual, without guidelines or regulations about what should be saved. In 1992 the IRS, for example, will begin optical scanning of every tax return, but paper records will nevertheless be maintained. He suggested that in the new electronic environment, archivists must recognize that archives are not places and records are not things. They need new approaches to managing new forms of information.

All meeting participants were then invited to discuss the papers and the issues they raised. Charles McClure, Syracuse University, expressed concern about the process of developing a research agenda and suggested that researchers often do not pay attention to such agenda. He also thought the Bikson and Hedstrom papers presented only one view of research, that other (such as qualitative and policy) models might also be useful. Bikson responded that research must be more systematic, more qualitative, not just more quantitative. She expressed interest in a variety of approaches. David Bearman, Archives and Museum Informatics, said he did not see conflict in this issue, just different research purposes and aims. He mentioned that Helen Wood, National Oceanic and Atmospheric Administration, was absent from the meeting because the information in her system was important in Operation Desert Storm, but that presenting that information as important from an archival point of view was difficult. He noted a lack of good models for appraising and managing such electronic systems.







Kenneth Thibodeau, National Archives and Records Administration, noted the importance of keeping the desired results of research always in mind. Archives have always been seen as the place of last resort, he said, which has kept archivists out of the operational sector. Hedstrom responded to Dollar's comments about the marketplace, saying she didn't think they disagreed but that she believes the marketplace is shifting from a preoccupation with costs to other matters like end-user needs. Dollar said he was looking at a half-empty glass while Hedstrom was looking at a half-full one.

Edwin Bridges, Alabama Department of Archives and History, suggested a lack of integrative structures hinders development of a national perspective about the issues. Sally Becker, Exxon, said that state and Federal agencies have a great deal of influence in their Requests for Proposals (RFPs) to vendors. Sprehe said that the National Archives must be more active in dictating what vendors supply. Larry Hackman, New York State Archives and Records Administration, said state and local governments would welcome this and suggested research be oriented to the specifications for automated systems. Richard Jacobs, NHPRC, suggested proposing the agenda to the NHPRC as criteria for funding research projects.

After the open discussion, Goff explained the structure for the remainder of the meeting. Participants would spend the afternoon in four preassigned task groups examining research questions reflecting the concerns submitted by archives, historical, and records management communities in response to the meeting notice. The planning committee had earlier consolidated these questions for division among the task groups according to social/political, organizational, economic, and technological concerns.

The individual task groups, each led by a member of the planning committee, discussed the questions assigned and developed criteria for evaluating the significance of project proposals. They examined the potential impact of various answers to the research questions by establishing priorities for projects within their domains.

## Day 2

Goff reconvened the plenary session on Friday morning, January 25. Task group leaders reported on the work of their groups.

**Social/Political Task Group.** Hedstrom reported this group's priorities for research:

- to study ten critical Federal information systems and their implications for records management and archives
- to define the concept of a record
- to examine information locator systems to see how they might be of use to archives
- to consider developing an institution to study information policy and archives and records management needs and issues
- to develop models for information policies that support archives and records management concerns

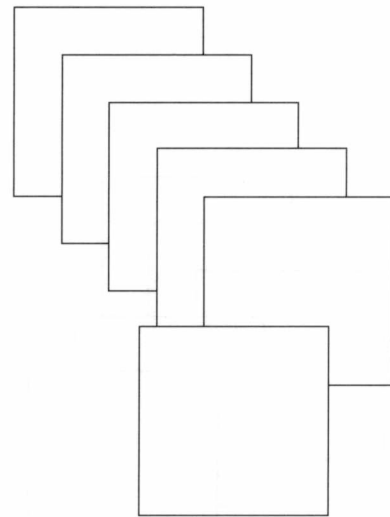
Other projects given less priority were studying documentation needs for information systems, studying legal issues, and comparing and contrasting state models for information resources management and information architecture. Hedstrom noted that the group discussed many other issues, including the need for issuing annual reports on the status of information technology and its impact on archives and records management programs. In a brief discussion, Hedstrom was asked whether the group had considered both public and private sector issues. She responded that since most of its members were government people, the group perspective tended to be public.

**Organizational Task Group.** Goff presented this group's priorities for research as questions about:

- the impact of electronic information technology on archives and records management programs
- the impact on use and users of electronic records
- the range of impact of the technology on traditional archival programs, functions, and principles
- the problem of what educational ventures are needed for working in modern technological environments

**Economic Task Group.** John McDonald, National Archives of Canada, outlined the work of this group, which identified these priorities for research:

- the economics of reflecting archival concerns in system design
- the economics of migrating electronic records through time
- the question of whether existing models could help archivists determine cost sharing that would ensure the preservation of archival records in electronic form



- identifying incentives for designing systems with the archival record as a focus
- the economic consequences of law and of policy on electronic recordkeeping
- economic and other criteria for user services in electronic records

Another important topic was the need for cost-benefit analysis, in both private and public sectors, of acquiring and maintaining electronic records.

**Technology Task Group.** Bearman identified this group's main research priority as determining archival functional requirements for modern information systems. He noted that this concern emerged over and over again in the group's discussion. Using as criteria whether other sectors in society might do the research or whether the concerns were purely archival, the group identified these projects for research:

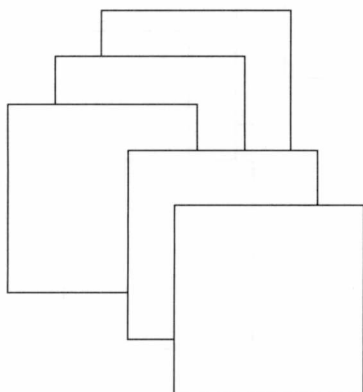
- a pilot metadata project to document the various systems either already in use or under development and to identify the potential impact of these systems for archival documentation or records management
- a project to identify the various "plateaus" existing in electronic information systems, determining with which plateaus archivists and records managers must be concerned and the consequences of using these plateaus
- the documentation requirements of new data objects (for example, CAD systems)

All these issues were primarily archival research priorities. Advocacy activities, including archival requirements for standards, criteria for successful migration of data, paper conversion to electronic media, archival functional requirements for documentation purposes, and access and use requirements for electronic information systems, were also identified.

A discussion period followed the group presentations. McClure asked whether any research tracking actual use of the information systems discussed by the Technology Task Group is in progress. Bearman said the need to track system use was discussed but that the group felt this type of activity should be included in research about various plateaus. Some discussion on the issue followed.

Bikson asked about the massive amount of data captured by these systems and whether there was any percent rule or other guideline for what portion of the records should be kept for archival purposes, or whether archives of electronic records would by their very nature be massive in scope. That this is part of the issue of how to build archival concerns into the systems was noted. Bearman stated that this would lead to a reconsideration of the archival mission.

Patricia Galloway, Mississippi Department of Archives and History, brought up the issue of what archivists wanted to document in the first place. McClure asked whether archivists should wait for others to define standards or, instead, do research about their need for standards, determine the standards, and *then* advocate for them. Dollar discussed continuing research,



at the national archives of Canada and the United States and at the United Nations, about information technology standards and their relevancy for archivists and records managers. Brief discussion about the kinds of world-wide research activities that archivists are involved in, or would be interested in tracking and influencing, followed.

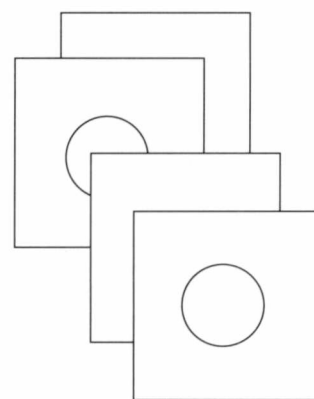
Richard Jacobs asked about whether the meeting should define general areas for generating proposals or define specific proposals. Goff and Bearman noted that both should come from the meeting but that the most important goal was to assist the NHPRC and other funding agencies in determining funding priorities for such research and to communicate to the field the opportunity for submitting such proposals. Hedstrom suggested a need to prioritize various research projects. Hackman proposed establishing a framework to help construct mechanisms to support such research. Goff asked the group whether it wanted to try to prioritize the areas already identified. McClure said that there was not yet enough information on the areas mentioned to assign priorities. McDonald stated that the task groups should work further, especially to establish links between suggestions of the various task groups. Bikson suggested that the planning committee look at other research agency program statements to encourage research proposals as potential models for the final report. Discussion about the nature of research needed, about using cost-benefit analysis models and other models such as risk management or overall performance measurement, followed. McClure suggested the performance measurement study just completed for the American Library Association for academic libraries as an example. This sparked animated discussion about the notion of performance measures and the broader archival mission. Page Miller, National Coordinating Committee for the Promotion of History, suggested the starting point for sequence and linking of research concerns be the Organizational Task Group's concept of struggling with the basic archival mission. Then the four task groups reconvened to work on their assignments.

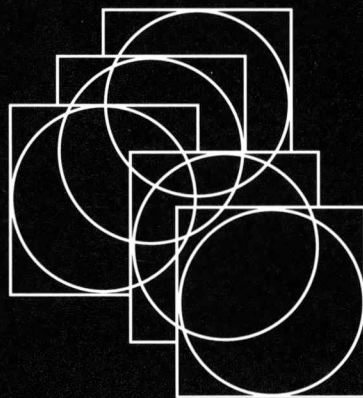
At the closing session on Friday afternoon, Bearman commented on the meeting, stating that its planners had had three objectives:

1. to develop a formal research agenda on electronic records that could be used by the NHPRC and other granting agencies for funding, considering, and selecting research proposals
2. to bring together a diverse group of individuals with a common stake and interest in the management of electronic records (This was accomplished at the meeting and had been useful in developing the outline of a research agenda.)
3. to provide an opportunity for archivists to articulate their perspective on the matter of electronic records technology and its management

Bearman noted that the meeting had provided a start on meeting those objectives and that its work would help in explaining to the NHPRC and the broader records community what is at stake in the management of electronic records. He emphasized that the issue is not just how long electronic media will last, but that it includes such matters as standards setting and advocacy.

Goff concluded the meeting by thanking all the participants and several individuals instrumental in its planning and staging.





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